THE WORK PLAN

TO DETERMINE THE CONDITION AND NEEDS OF PAVEMENTS AND SHOULDERS

OF THE NEW YORK STATE HIGHWAY SYSTEM

BY

DONALD N. GEOFFROY
TECHNICAL SERVICES DIVISION
TASK FORCE CHAIRMAN

JULY 1, 1987

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MARIO M. CUOMO, Governor FRANKLIN E. WHITE, Commissioner

MEMORANDUM
DEPARTMENT OF TRANSPORTATION

TO: Franklin E. White, Commissioner, 5-506

FROM: Donald N. Geoffroy, Technical Services Division, 7A-210

SUBJECT: WORK PLAN TO DETERMINE THE CONDITION AND NEEDS OF PAVEMENTS AND SHOULDERS OF THE NEW YORK STATE HIGHWAY SYSTEM

DATE: July 1, 1987

At the May 27, 1987 meeting on CIMS, you appointed a Task Force to produce a plan to develop products for the entire state highway system that are similar to those generated at the level of the interstate system.

Attached is the work plan for your approval. The overall goal is to determine the condition and needs of pavements and shoulders of the state highway system. A number of factors are critical for the non-interstate system, namely: large mileage, variation in the drainage conditions, non-uniformity in the construction and treatment histories, variable shoulder standards and variable traffic volumes. These factors plus the existence of a large urban and suburban component dictate the need to develop a survey methodology that will collect distress data at a degree of detail that is different from that used for the interstate system.

The detailed scope of work and required activities that appear in the work plan have been formulated on the basis of the experience we have gained in developing the Interstate Distress Survey. While the latter required an effort extended over a period of approximately three (3) years, the present work plan will achieve the development of the distress survey, distress-treatment matrices (including service lives and costs) and data management capability within sixteen (16) months. Furthermore, in accordance with the work plan, the survey of the entire state highway system will be completed within twenty (20) months while the data will be analyzed and final reports on the condition and needs for pavements and shoulders will be available within twenty-five (25) months from the date of the approval of this project. Figure 1 (page 8) of the work plan shows the diagram of objectives for the required activities. A month-by-month schedule is shown in Table 3 (page 33) based on the optimal coordination of activities appearing in Figure 2 (page 32).

The work plan is the product of a joint effort of the Department groups that compose the appointed Task Force. Representatives of these groups

met on June 22 to develop the scope of work and the sharing of responsibilities for achieving the identified objectives. Table 4 (page 36) shows the participation of each group in the various activities of this project. It can be seen that the Technical Services Division has the lead role in engineering activities, the Planning Division in the data collection and handling methodology and IRM in data management and software development. Special efforts have been made in the work plan to render the products of this project congruent with the Department's overall plans (e.g., use of ORACLE as database software, etc.) Draft copies of the work plan were circulated on June 25 and all members of the Task Force had an opportunity to review and comment on the work plan. The Information Resources Manager requested more time to adequately develop his resource estimates. The Planning Division responded expressing reservations inlcuding the fast pace of this effort.

A critical aspect of this project is the time period within which products for the entire state highway system must be developed and implemented. This results in the need for the resources listed in Part 8 (page 37). The plan and schedule build upon the knowledge and experience gained from developing and implementing the Interstate Distress Survey. Dr. D. A. Grivas from RPI has been an integral part of the development effort for the Interstate Distress Survey. The schedule provided in Table 3 assumes that Dr. Grivas will continue to be available to the Technical Services Division to assist in developing the methodology for the entire state highway system. It is estimated that this schedule would need to be slipped at least six months if Dr. Grivas is not available to assist the Technical Services Division.

Three decision points have been identified in the schedule appearing in Table 3 (page 33). The first decision point will address the selection of the survey methodology while the second decision point will address the manner in which the condition and needs of the state highway system will be reported to the various users. At the third decision point, the future direction of this project will be examined. Technical concerns during the first two decision points will be addressed by the Task Force. The possibility exists for the need to request additional resources in the form of contractual services (for example, in conducting part of the survey or developing software for data analysis) in order to complete this project. Requests for such contractual services will be made only after a thorough evaluation of all options and a determination that the needed resources are not available within the Department.

On behalf of the Task Force, I request your approval of this plan and permission to proceed.

DNG:db
Attachment

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THE WORK PLAN

TO DETERMINE THE CONDITION AND NEEDS OF PAVEMENTS AND SHOULDERS OF THE NEW YORK STATE HIGHWAY SYSTEM

BY

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JULY 1, 1987

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MARIO M. CUOMO, Governor FRANKLIN E. WHITE, Commissioner

SUMMARY

The present document outlines the work plan that will be followed in order to determine the condition and needs of pavements and shoulders of the New York State highway system. This work plan has been prepared in response to a directive by the Commissioner and other Department Executives to develop and implement products for the entire state highway system that are similar to those generated for the interstate system.

A number of factors are critical for the non-interstate system, such as large mileage, variation in the drainage conditions, non-uniformity in the construction and treatment histories, variable shoulder standards and variable traffic volumes. These factors plus the existence of a large urban and suburban component dictate the need to develop a survey methodology that will collect distress data at a degree of detail that is different from that used for the interstate system.

The scope of work involves a total of fifteen activities that must be undertaken within time periods specified so as to allow the timely completion of this project. Included in the scope of work are the development of a distress survey methodology, the establishment of appropriate treatments (with associated service lives and costs) and the development of software to analyze and report the condition and needs of pavement and shoulders. Each activity is described in the document in terms of its objective, rationale, specific tasks, required resources and deliverables.

A month-by-month schedule of the activities is provided in the work plan. It has been formulated to achieve optimal coordination among the various activities, using best estimates of the time periods required to complete the identified objectives. Decision points during the execution of

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this project have been also identified in the schedule.

In accordance with the established schedule, the development of the distress survey methodology, distress-treatment matrices (including service lives and costs) and data management capability will be achieved within sixteen (16) months. The survey of the entire state highway system will be completed within (20) months while the data will be analyzed and final reports on the condition and needs for pavements and shoulders will be available within twenty-five (25) months from the date of the approval of this project.

The participation of the various groups that constitute the Task Force is described in the document. Each of the fifteen activities involves a Lead Group and Member Groups which are charged with tne completion of the identified tasks within the specified time period.

The text of the present document is organized in nine parts. Part 1 is an Introduction that summarizes relevant points made during the May 27, 1987 meeting of the Executive Management of the Department. The charge and membership of the Task Force are given in Part 2. Part 3 explains the relationship between anticipated products from the present effort and those identified in the Department's Pavement Management System. The scope of work is outlined in Part 4 while Part 5 provides a description of each activity including objective, rationale, specific tasks, resources and deliverables. Part 6 explains the coordination of the various activities in the form of a flow-chart and provides a month-by-month schedule as well as decision points. The participation of the various groups tnat compose the Task Force is given in Part 7. Part 8 provides a synthesis of activities and human resources needs for each group of the Task Force. Finally, Part 9 describes the home organization for the major component of this project that will be conducted within the Technical Services Division.

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1. INTRODUCTION

The development of a Comprehensive Infrastructure Maintenance Strategy (CIMS) that emphasizes cost effective preventive maintenance is a major goal of the New York State Department of Transportation. A plan for the Development of CIMS was presented to the Executive Management of the Department on May 27, 1987. The plan provided a statement of the problem, description of objectives, scope of work, specific tasks to be achieved and organizational alternatives for the development of CIMS.

Included among the main products of CIMS are four major infrastructure management systems, namely; a pavement and shoulder management system; a bridge management system consisting of three subsystems, one for bridge decks, one for bridge superstructures and one for bridge substructures; a traffic control devices management system consisting of two subsystems, one for signs and one for signals; and a management system for roadside structures and appurtances. Each of the above systems will assess the condition of the infrastructure elements witnin its boundaries, identify available maintenance alternatives, estimate associated costs, and predict future condition and needs. For those elements of the infrastructure not contained within one of the above major systems, CIMS has provisions for the undertaking of a similar analysis which will result in appropriate guideline statements.

During the May 27, 1987 meeting, considerable discussion was devoted toward establishing priorities in the development of the various products of CIMS. Commissioner White and other Department Executives expressed an interest in the early development and implementation of the pavement and bridge components of CIMS. Initial products of the Pavement Management System that have been developed for the Interstate System were embraced as valuable tools for the selection of highway projects by the Regions. These initial products included the distress survey and the treatment selection guidelines based on

distress data. Although a systematic effort for bridges has not been initiated yet, the consensus was that the existing bridge inventory system contained adequate information to accelerate a similar early development of the Bridge Management System.

It was decided that the development of CIMS will be pursued on an incremental basis with emphasis placed on an early implementation of useful products from the pavement and bridge management systems. The concept of CIMS as a total system and the development of appropriate expert systems were reinforced as significant long term objectives.

The impact of the accelerated development of CIMS in the light of other major Departmental Initiatives was also explored. Commissioner White stated that the highest priority is given to the Capital Program Planning Initiative followed by that of tne Management Information System (MIS). Because of the potential contribution to project selection and the overall capital program planning effort, the development of early products from the pavement and bridge management systems was included in the high priority list.

A Task Force was appointed to develop detailed schedules and projected completion dates for early products on pavements and shoulders by July 1, 1987. The present document is the response to the above charge.

2. THE CHARGE AND MEMBERSHIP OF THE TASK FORCE

The charge of the Task Force is to produce a work plan by July 1, 1987 for the development of early products for the Department's Pavement Management System. These products are to be similar to those developed for the interstate system but applicable to pavements and shoulders of the entire state highway network.

The Task Force appointed at the May 27, 1987 meeting consists of the following individuals:

Chairman:

Donald N. Geoffroy, Technical Services Division, 7A-210

Members:

John E. Brentzel, Information Resource Management, 5-215
W. Stearns Caswell, G.R.I.C. TASK FORCE, 4-115
William H. Kikillus, Regional Design Engineer, Region 8
Richard A. Malchow, Office of Strategic Planning and Management Systems, 5-511
Jonathan M. Newman, Program Planning and Management Group, 5-514B
Louis Rossi, Planning Division, 4-115
Jerome J. Thomas, Highway Maintenance Division, 5-217

3. THE POSITION OF THIS PROJECT WITHIN THE PAVEMENT MANAGEMENT SYSTEM DEVELOPMENT EFFORT

During the course of this project, special efforts will be made to place early products of the various tasks within the framework of the Department's Pavement Management System. These early products include the raw data on distresses that will be surveyed at the state highway system and a preliminary treatment selection methodology based mostly on distresses.

The relationship between products from this effort and those associated with the Pavement Management System can be seen schematically in Tables 1 and 2. Table 1 has been taken from the October 28, 1986 briefing document entitled "Pavement Management System Development and Implementation" that was presented to Commissioner White and other Department Executives. It lists the various PMS activities, the products of each activity, the information provided by each product and the uses and users of this information. Table 2 has been prepared in the same format and lists only those early products that will be generated in the course of this project.

TABLE 1 Products of PMS Activities and Their Uses

PMS ACTIVITY	PRODUCT OF ACTIVITY	INFORMATION PROVIDED BY PRODUCT	USE OF INFORMATION	USER OF INFORMATION
DISTRESS SURVEY	RAW DATA	DISTRESS TYPE, SEVERITY AND EXTENT FOR ASPHALT, CONCRETE AND OVERLAYED PAVEMENTS AND SHOULDERS	• MAINTENANCE ACTIONS • DETERMINATION OF CAUSES	• RESIDENT ENGINEERS • REGIONAL HIGHWAY DESIGN GROUP • REGIONAL MAINTENANCE DIVISION • REGIONAL PLANNING AND DEVELOPMENT GROUP • HIGHWAY MAINTENANCE DIVISION • FACILITY DESIGN DIVISION • PLANNING DIVISION • PROGRAM PLANNING AND MANAGEMENT GROUP
	AVERAGE DISTRESSES	SUMMARIES OF INDIVIDUAL DISTRESSES	• PROJECT EVALUATION • MONITORING OF DETERIORATION	
	DISTRESS INDICES	SUMMARIES OF COMBINED DISTRESSES	• PROJECT EVALUATION • ENGINEERING BEHAVIOR	
	OVERALL DAMAGE INDEX	BOTTOM-LINE SUMMARY OF DAMAGE FOR EACH PAVEMENT AND SHOULDER SECTION	• NETWORK EVALUATION • PROJECT DAMAGE RANKING	
SECTION CONDITION DIAGNOSIS	DEFICIENCY IDENTIFICATION	• DOCUMENTATION OF PROBLEM • MATERIAL BEHAVIOR • STRUCTURAL BEHAVIOR • INFLUENCE OF TRAFFIC LOADS AND ENVIRONMENTAL FACTORS • IMPORTANCE OF CONSTRUCTION DETAILS	• ESTABLISH CANDIDATE PROJECTS • IDENTIFICATION OF LOCATIONS WITH SPECIFIC DEFICIENCIES • SUBSTANDARD FEATURES	• ALL REGIONAL GROUPS INVOLVED IN THE PROJECT AND TREATMENT SELECTION PROCESS • FACILITY DESIGN DIVISION • HIGHWAY MAINTENANCE DIVISION • PROGRAM PLANNING AND MANAGEMENT GROUP
	DIAGNOSIS OF DEFICIENCY			
	ESTABLISHMENT OF CAUSES			
TREATMENT SELECTION	ALTERNATIVE TREATMENTS	• APPROPRIATE TREATMENT ALTERNATIVES • COST ESTIMATES OF ALTERNATIVES • JUSTIFICATION FOR SELECTED TREATMENT (SAFETY, CONDITION, CAPACITY) • BENEFITS OF TREATMENT	• LIFE-CYCLE COST EVALUATION • COMPARISON OF CANDIDATE PROJECTS • FINAL PROJECT SELECTIONS • PREPARATION OF PIR • PROJECT REVIEW AND APPROVAL • SYSTEMIZE PAVEMENT REHABILITATION DECISIONS	• RESIDENT ENGINEERS • REGIONAL HIGHWAY DESIGN GROUP • REGIONAL HIGHWAY MAINTENANCE GROUP • HIGHWAY MAINTENANCE DIVISION • FACILITY DESIGN DIVISION • PROGRAM PLANNING AND MANAGEMENT GROUP
	LIFE-CYCLE COSTS OF TREATMENTS			
	TREATMENT SELECTION METHODOLOGY			
	REHABILITATION DECISION-MAKING METHODOLOGY			
OPTIMIZATION AND PRIORITIZATION	FACTORS THAT IMPACT PROJECT PRIORITIZATION	• BENEFITS OF PREVENTIVE MAINTENANCE • CONSEQUENCES OF DEFERRING MAINTENANCE • TARGET LEVELS OF PAVEMENT NETWORK CONDITION AND COSTS TO REACH THEM	• OPTIMUM TIMING FOR PROJECT CONSTRUCTION • BEST SOURCE FOR PROJECT FUNDING • IMPACT OF PROJECT ON NETWORK • EFFECT OF PROJECT DEFERENCE ON COST AND DETERIORATION • ESTABLISH PRIORITIZATION POLICIES • IMPROVE AVAILABILITY OF FUNDS AND BUDGET REQUESTS	• REGIONAL PLANNING AND DEVELOPMENT GROUP • REGIONAL HIGHWAY MAINTENANCE GROUP • HIGHWAY MAINTENANCE DIVISION • PLANNING DIVISION • PROGRAM PLANNING AND DEVELOPMENT GROUP
	PREVENTIVE AND CORRECTIVE MAINTENANCE STRATEGIES			
	RATE OF RETURN OF REHABILITATION INVESTMENT			
FEEDBACK	PROJECT PERFORMANCE	• TRUE DETERIORATION RATE AND LIFE-CYCLE COSTS • ENGINEERING PERFORMANCE OF PAVEMENT TREATMENTS • PITFALLS IN PROJECT SELECTION PROCESS • CAUSES OF COST OVERRUNS (E.G., CHANGES OF PROJECT SCOPE, ETC.)	CONTINUOUSLY IMPROVE THE PROJECT SELECTION, EVALUATION AND IMPLEMENTATION PROCESS	•ALL REGIONAL GROUPS INVOLVED IN THE PROJECT SELECTION PROCESS •PROGRAM PLANNING AND MANAGEMENT GROUP •HIGHWAY MAINTENANCE DIV. •FACILITY DESIGN DIV. •CONSTRUCTION DIV.
	ACTUAL PROJECT COSTS			

TABLE 2. EARLY PRODUCTS AND THEIR USES

PMS ACTIVITY	PRODUCT OF ACTIVITY	INFORMATION PROVIDED BY PRODUCT	USE OF INFORMATION	USER OF INFORMATION
DISTRESS SURVEY	RAW DATA	DISTRESS TYPE, SEVERITY AND EXTENT FOR ASPHALT, CONCRETE AND OVERLAYED PAVEMENTS AND SHOULDERS	• MAINTENANCE ACTIONS • DETERMINATION OF CAUSES	• RESIDENT ENGINEERS • REGIONAL HIGHWAY DESIGN GROUP • REGIONAL MAINTENANCE DIVISION • REGIONAL PLANNING AND DEVELOPMENT GROUP • HIGHWAY MAINTENANCE DIVISION • FACILITY DESIGN DIVISION • PLANNING DIVISION • PROGRAM PLANNING AND MANAGEMENT GROUP
	AVERAGE DISTRESSES	SUMMARIES OF INDIVIDUAL DISTRESSES	• PROJECT EVALUATION • MONITORING OF DETERIORATION	
			•	
			•	
			•	
			•	
SECTION CONDITION DIAGNOSIS	DEFICIENCY IDENTIFICATION	• DOCUMENTATION OF PROBLEM	• ESTABLISH CANDIDATE PROJECTS	• ALL REGIONAL GROUPS INVOLVED IN THE PROJECT AND TREATMENT SELECTION PROCESS • FACILITY DESIGN DIVISION • HIGHWAY MAINTENANCE DIVISION • PROGRAM PLANNING AND MANAGEMENT GROUP
		•		
		•	• IDENTIFICATION OF LOCATIONS WITH SPECIFIC DEFICIENCIES	
		•		
	ESTABLISHMENT OF CAUSES	•	• SUBSTANDARD FEATURES	
TREATMENT SELECTION	ALTERNATIVE TREATMENTS	• APPROPRIATE TREATMENT ALTERNATIVES • COST ESTIMATES OF ALTERNATIVES	•	• RESIDENT ENGINEERS • REGIONAL HIGHWAY DESIGN GROUP • REGIONAL HIGHWAY MAINTENANCE GROUP • HIGHWAY MAINTENANCE DIVISION • FACILITY DESIGN DIVISION • PROGRAM PLANNING AND MANAGEMENT GROUP
			•	
	TREATMENT SELECTION METHODOLOGY	•	• FINAL PROJECT SELECTIONS • PREPARATION OF PIR • PROJECT REVIEW AND APPROVAL	
		•	•	
OPTIMIZATION AND PRIORITIZATION		• BENEFITS OF PREVENTIVE MAINTENANCE	•	• REGIONAL PLANNING AND DEVELOPMENT GROUP • REGIONAL HIGHWAY MAINTENANCE GROUP • HIGHWAY MAINTENANCE DIVISION • PLANNING DIVISION • PROGRAM PLANNING AND DEVELOPMENT GROUP
			•	
	PREVENTIVE AND CORRECTIVE MAINTENANCE STRATEGIES	•	•	
			•	
			•	
FEEDBACK		•		•ALL REGIONAL GROUPS INVOLVED IN THE PROJECT SELECTION PROCESS •PROGRAM PLANNING AND MANAGEMENT GROUP •HIGHWAY MAINTENANCE DIV. •FACILITY DESIGN DIV. •CONSTRUCTION DIV.
		•		
		•		
		•		

4. SCOPE OF WORK

4.1 Overview

The overall goal of this project is to develop and implement early products of the Department's Pavement Management System which will make it possible to determine the condition and needs for the pavements and shoulders of the entire state highway system. The general methodology and degree of detail with which this goal will be achieved are similar to those used for the interstate system.

Thus, the physical condition of pavements and shoulders will be documented on the basis of the types of distresses that are present on each roadway section. The magnitudes of the various distresses will be determined using well defined scales that consider both the severity and the extent of each distress. The needs of pavements and shoulders will be expressed in terms of the maintenance and rehabilitation treatments that are appropriate for each roadway section. This will be achieved using a template between distresses and treatments that will be developed on the basis of past practices and other experience available within the Department. Each recommended treatment will be associated with estimates of its expected service life and cost.

4.2 Statement of Objectives

In Figure 1 is shown the diagram of objectives of the various activities that must be undertaken in order to achieve the goal of this project. Each block in the diagram lists a specific objective and is assigned a number that denotes its approximate order within the sequence of activities to take place. The diagram is organized in a manner that shows the relationship among the various objectives.

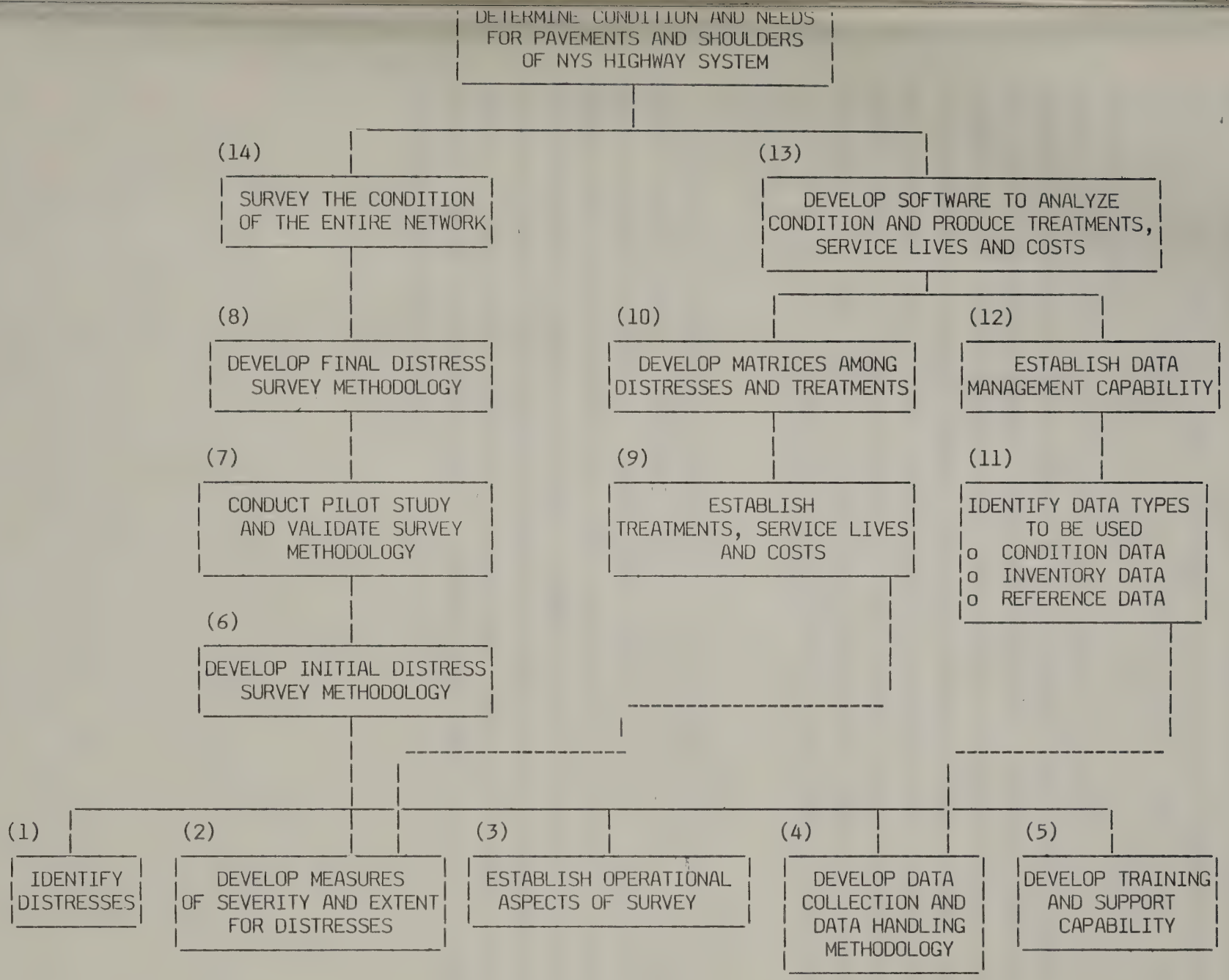

FIGURE 1. DIAGRAM OF OBJECTIVES

It is clear from Figure 1 that the successful completion of this project (Block 15) requires an ability to survey the condition of the entire network (Block 14) and a parallel ability to handle and analyze the large number of data (Block 13). Considering that the distress survey will document the condition of roadways at nominal lengths of 0.1 mile (as was the case with the survey used for the interstate system), the number of records that will be produced if the entire state system is to be surveyed will exceed 160,000. This requires the establishment of some appropriate data management capability (Block 12). The latter will take into consideration the overall direction of the Department in computer hardware (IBM) and database software (ORACLE) and make provisions for a future transference of the data to be used in this project (Block 11). The development of the matrices among distresses and treatments (Block 10) requires a review and documentation of previous practices by the Department on treatments and estimation of their service lives and costs (Block 9).

In order to survey the condition of the state roadway system, an appropriate distress survey methodology must be developed (Block 8). The final survey will be the product of a pilot study (Block 7) that will validate and finalize the initial distress survey technique (Block 6). The latter requires the development of training and support capability for the field work of the surveyors (Block 5), establishment of data collection and handling methodology (Block 4), and specific operational guidelines (Block 3). Central to the distress survey are the measures of severity and extent (Block 2) of all identified distresses (Block 1).

5. DESCRIPTION OF ACTIVITIES

1. OBJECTIVE: Identify Distresses

1.1 RATIONALE:

- Certain distress types are necessary to assess the condition of pavements and shoulders and establish appropriate treatment methods for the non-interstate System.

- There are distinct differences between pavements and shoulders at the interstate system and those at the rest of the state system (e.g., drainage conditions, foundations, shoulder standards, etc.). Thus, distresses identified for the Interstate System are not directly transferable to the entire state system.

1.2 TASKS:

1. List all possible pavement and shoulder distress types.
2. Determine which distresses are the most significant and meaningful when assessing pavement and shoulder condition on the non-interstate system.
3. Determine which distress assessments can be made with regard to the operational aspects of the survey.
4. Determine which distresses can be readily observed and measured.
5. Consolidate list to that of practically assessed distresses.
6. Establish distress definitions.

1.3 RESOURCES:

- Engineers with experience in pavement materials, shoulder specifications, highway foundation and design.
- 4 people
- 6 month time period
- Equipment - vehicle for field assignments

1.4 DELIVERABLES:

- List of distresses for pavements and shoulders.

2. OBJECTIVE: DEVELOP MEASURES OF SEVERITY AND EXTENT FOR EACH DISTRESS TYPE

2.1 RATIONALE:

- Measurements are needed that consider distress severity and extent in order to describe and quantify each distress type. Severity is associated with the different stages of pavement deterioration, while extent describes the length of each pavement and shoulder section that is affected by the presence of distresses.

2.2 TASKS:

1. Refine definitions of distresses.

2. Test measurement system in the field.

3. Finalize distress measures.

2.3 RESOURCES:

- Engineers well versed in the areas of pavement materials, shoulder specifications, highway foundation and design.

- 4 people

- 6 month time period

- Equipment - vehicle for field assignments

2.4 DELIVERABLES:

- Measurement system of severity and extent for distresses.

3. OBJECTIVE: ESTABLISH THE OPERATIONAL ASPECTS OF THE SURVEY.

3.1 RATIONALE:

- Operation techniques must be established to enable the gathering of the distress data.

3.2 TASKS:

1. Identify options available in connection with the different operational methods of collecting data, i.e., shoulder survey, laser or ultrasonic survey, photolog-based survey, sampling, etc.

2. Determine whether a single methodology can be used to survey all highway subsystems (interstate, primary, secondary, parkways), or whether different methods are necessary for different subsystems.

3. Evaluate operational methods and make recommendations.

3.3 RESOURCES:

- Engineers well versed in the areas of pavement materials, shoulder specifications, highway foundation and design.

- 4 people

- 6 month time period

- Equipment - vehicle for field assignments

3.4 DELIVERABLES:

- Operational procedures for the distress survey.

4. OBJECTIVE: DEVELOP DATA COLLECTION AND DATA HANDLING METHODOLOGY

4.1 RATIONALE:

- The establishment of an appropriate data handling methodology will allow a timely execution of the survey of the entire highway system and will ensure availability of data to all users.

- The development of communication ties will make it possible to transport distress data to other databases within the Department as required.

4.2 TASKS:

1. Establish detailed data collection and data handling requirements.
2. Evaluate existing means of data collection and handling.
3. Modify existing means or develop a new data collection technique to meet requirements.
4. Select appropriate equipment and software to use for data collection and handling purposes.
5. Establish ability to transfer distress data to a permanent database.
6. Design needed interface between the data collection tool in the field and the permanent database.
7. Provide a code for the above design.
8. Test and finalize the data collection and handling methodology.

4.3 RESOURCES:*

	TASK	PERSONAL DESCRIPTION	MANPOWER	DURATION (MONTHS)	MAN MONTHS
1.	Detail data collection requirements	Pavement Engineer System Analyst Data Analyst	3	1/4	3/4
2.	Evaluate existing system and means of collection	Pavement Engineer System Analyst Data Analyst	3	1/4	3/4
3.	Modify existing system or develop new collection system	Pavement Engineer System Analyst Data Analyst	3	1/2	1-1/2
4.	Select equipment and software to meet the requirements	System Analyst	1	1/4	1/4
5.	Establish ability to transfer distress data to database	System Analyst Programmer Analyst	2	1/4	1/2
6.	Design needed interfaces from equipment to database	System Analyst Programmer Analyst	2	1/2	1
7.	Code the design	Programmer Analyst	2	1	2
8.	Test and finalize the data collection and handling methodology	Pavement Engineer Data Analyst Programmer Analyst	3	1	3

*The resources required for this activity have been estimated by the Technical Services Division

4.4 DELIVERABLES:

1. Automated data collection system to be used for the distress survey.

2. Automated procedure for transferring data from collection system to interim and final database systems.

5. OBJECTIVE: DEVELOP TRAINING AND SUPPORT CAPABILITY

5.1 RATIONALE:

- Training and other support is necessary to execute a valid and successful distress survey.

5.2 TASKS:

1. Develop a training program which describes the operations of the distress survey.

2. Introduce the value and purpose of the survey.

3. Teach the meaning of scales of the distresses.

4. Describe responsibilities of raters.

5. Explain operating procedures.

6. Develop rating certification to check the competency of trainees.

5.3 RESOURCES:

- Engineers intimately familiar with the survey to train raters who are generally technicians.

- 4 people

- 1 month

- Equipment - training support vehicle, equipment, etc.

5.4 DELIVERABLES:

- A Training Manual

6. OBJECTIVE: DEVELOP INITIAL DISTRESS SURVEY METHODOLOGY

6.1 RATIONALE:

- The initial distress survey must be developed for trial purposes prior to the final distress survey. This objective is a synthesis of the initial distress survey that covers Objectives 1 through 5.

6.2 TASKS:

1. Review the products of objectives 1 through 5.

2. Develop procedures for the distress survey.

3. Document the methodology for the survey.

6.3 RESOURCES:

- Engineers and data analysts

- 4 people

- 2 months

- Computer

6.4 DELIVERABLES:

- Documented methodology for the initial distress survey

- First version of Distress Manual

7. OBJECTIVE: CONDUCT PILOT STUDY AND VALIDATE SURVEY METHODOLOGY

7.1 RATIONALE:

- The pilot study is a test of the initial distress survey developed under Objective 6.

7.2 TASKS:

1. Assemble and train a team of pavement and shoulder raters.

2. Conduct the initial distress survey on representative pavement and shoulder sections.

3. Evaluate the validity of the condition data recorded by the survey.

7.3 RESOURCES:

- Engineers and technicians

- 4 people

- 1 month

- Equipment - rating vehicle

7.4 DELIVERABLES:

- Findings of pilot study

- Repeatability of the survey

- Examples of distress data and analysis

8. OBJECTIVE: DEVELOP FINAL DISTRESS SURVEY METHODOLOGY

8.1 RATIONALE:

- The final distress survey methodology will be used to determine the condition of the pavements and shoulders of the state highway system.

8.2 TASKS:

1. Evaluate the results of the pilot study.

2. Make necessary revisions and adjustments.

3. Finalize training manual and rater activities.

4. Conduct training of the rating crews.

8.3 RESOURCES:

- Regular engineering staff and rating technicians

- 28 people : 4 engineers and 24 technicians

- 2 months

- Equipment - computer

8.4 DELIVERABLES:

- The final distress survey and operational guidelines to be used in determining the condition of the state highway system.

9. OBJECTIVE: ESTABLISH TREATMENTS, SERVICE LIFE AND COST/MILE

9.1 RATIONALE:

- The collection, evaluation and documentation of all information available in the Main and Regional Offices are required in order to determine probable causes of distresses, treatment alternatives, expected service lives and estimated costs.

- The above information is a necessary step for the development of distress-treatment.

9.2 TASKS:

1. Identify and access sources of information on treatments, service lives and costs for pavements and shoulders.

2. Obtain available records on highway construction and treatment histories.

3. Identify locations (geographical) of records on the highway system.

4. Validate appropriateness of treatments from records available within the Technical Services Division, Highway Maintenance Division, Regional Offices and Residencies.

5. Describe treatment options for various distresses.

6. Establish estimates of service lives of treatments from available records.

7. Provide estimate of cost per mile for each treatment alternative.

9.3 RESOURCES:

- 5 engineers for 3 months

9.4 DELIVERABLES:

1. Table of treatments

2. Estimates of service lives

3. Estimates of cost per mile

10. OBJECTIVE: DEVELOP MATRICES BETWEEN DISTRESSES AND TREATMENTS

10.1 RATIONALE:

- A systematic approach is needed to determine the most appropriate treatment for the condition of each section of the state highway system.

10.2 TASKS:

1. Develop treatment matrices for rigid, flexible and overlayed pavements and shoulders that include estimates of costs and expected lives.

2. Determine whether different sets of matrices are warranted for different classes of roadways (primary, secondary, parkways, urban vs. rural).

10.3 RESOURCES:

- Representatives from Technical Services Division, Highway Maintenance Division, Regional Offices and Residencies.

- 5 engineers - 1 month

10.4 DELIVERABLES:

- A matrix for each pavement and shoulder category based on road classification.

11. OBJECTIVE: IDENTIFY DATA TYPES

11.1 RATIONALE:

- It is essential to design a database that is flexible, can answer questions posed by users, and can be accessed by many users and divisions.

- The development of data types requires an appropriate database design. This design is accomplished through an effort involving both user groups of the data and computer specialists.

- A proper database design will allow flexibility in the data inquiry capabilities.

11.2 TASKS:

1. Establish representative user group.
2. Conduct interview of users.
3. Develop preliminary data model.
4. Meet with user group to review model
5. Alter and revise data model as required.
6. Identify all data items to be incorporated into data model.
7. Normalize the data into the model.
8. Prepare preliminary data dictionary.
9. Review data dictionary.
10. Revise and finalize database.
11. Complete design and data dictionary.

11.3 RESOURCES:*

	TASK	PERSONAL DESCRIPTION	MANPOWER	DURATION (MONTHS)	MAN MONTHS
1.	Establish representative user group committee	Chief Programmer System Analyst (data base design)	2	1/4	1/2
2.	Conduct interview of users	Chief Programmer System Analyst (data base design) 5 members of user group	7	1	7
3.	Develop preliminary data model		2	1/2	1
4.	Meet with user group committee to review data model		7	1/8	7/8
5.	Alter and revise data model as required		2	1/4	1/2
6.	Identify all data items to be incorporated into data model		7	1/2	3-1/2
7.	Normalize the data into the model		2	1/4	1/2
8.	Prepare preliminary data dictionary		2	1/4	1/2
9.	Review data dictionary		7	1/4	1-3/4
11.	Revise and finalize database and complete activity		2	1/4	1/2

11.4 DELIVERABLES:

A database to be used for the analysis and reporting requirements of this project that is compatible with other systems within the Department.

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* The resources required for this activity have been estimated by the Technical Services Division

12. OBJECTIVE: ESTABLISH DATA MANAGEMENT CAPABILITY

12.1 RATIONALE:

- The establishment of data management capability will allow the data generated in this preliminary study to: (a) be shared with and utilized by other systems currently under consideration or development (i.e. the Highway Database System); and (b) be combined, to the extent needed, with other existing data in the Department.

- The Department has decided to bring about a standardized configuration for software development. Key elements of this standardization are the selection of Oracle as the database software standard and IBM as the mainframe computer. The work performed in this preliminary methodology will ensure an ability to transfer products to this environment.

12.2 TASKS:

1. Identify all types of computer hardware involved among all user groups and divisions.
2. Identify the communication bridges to each computer.
3. Prepare lists of software to transfer data.
4. Identify the individual sources of data to be transferred (described previously in Objective 11).
5. Design computer codes to allow data transfer to the target machine and software (IBM & ORACLE Database)
6. Prepare the schemes to achieve backing up data, security of data, and user access.

12.3 RESOURCES:*

	TASK	PERSONAL DESCRIPTION	MANPOWER	DURATION (MONTHS)	MAN MONTHS
1.	Identify all types of computer hardware involved among all user groups and divisions	Chief Programmer System Analyst	2	1/2	1
2.	Identify the communication bridges to each set of computers	Chief Programmer System Analyst Communication Engineer	3	3/4	2-1/4
3.	Prepare lists of hardware or software to transfer data	System Analyst	1	1/4	1/4
4.	Identify the individual sources of data to be transferred (from Objective 11)	Chief Programmer System Analyst Programmer	3	1/4	3/4
5.	Design computer codes to allow data transfer to the target machine and software (IBM & Oracle database)	Chief Programmer Programmer (2)	3	1	3
6.	Prepare the schemes to achieve backing up data, security of data, and user access	Chief Programmer System Analyst	2	1	2

*The resources required for this activity have been estimated by the Technical Services Division

12.4 DELIVERABLES:

- Completed communication paths to transfer data among all different types of computer equipment in the Department

- A plan for the security of and access to data

13. **OBJECTIVE: DEVELOP SOFTWARE TO ANALYZE CONDITION AND PRODUCE TREATMENTS, SERVICE LIVES AND COSTS**

13.1 RATIONALE:

- The development of software is necessary to store, analyze and manipulate the distress data into the form of various reports. The reports will establish the recommended treatments for the surveyed pavements and shoulders, and will assign service lives and costs to these treatments. The software will be in standardized form (i.e., Oracle database and IBM mainframe) so that it is compatible with other departmental systems.

13.2 TASKS:

1. Summarize the software already developed for the Interstate Distress Survey.

2. Modify and expand the Interstate Distress/Treatment software to accommodate information on the entire highway system. This will be done in accordance with the task requirements set forth in Objectives 4, 11, and 12.

3. Complete the software needed to produce reports useful to the various users. It is anticipated that these reports will include: Section Reports, Residency Route-Section Reports, Residency Treatment Reports, Residency Summary Reports, Regional Residency Summary Reports, Regional Treatment Summary Reports, Statewide Route Summary Reports, and Statewide Treatment Summary Reports.

13.3 RESOURCES:*

It is difficult to provide, at the present time, resource requirements for this objective. However, it is estimated that the manpower identified under Resources in Objectives 11 and 12 will be adequate for the purposes of this project.

13.4 DELIVERABLES:

Standardized software which is capable of reporting to the various users the condition and needs of the state highway system.

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*The resources required for this activity have been estimated by the Technical Services Division

14. OBJECTIVE: SURVEY THE CONDITION OF THE ENTIRE NETWORK

14.1 RATIONALE:

- The developed distress survey will be used to collect distress data that will establish the condition of the pavements and shoulders of the state highway system.

14.2 TASKS:

1. Survey pavements and shoulders of the state highway system.

2. Record and handle distress data.

3. Transfer data to Main Office.

14.3 RESOURCES:*

- Rating teams from Main and Regional Offices
- 28 persons - 8 teams with 3 rating technicians + 1 Main Office team with 2 technicians + 2 engineers
- 4 months
- Equipment - rating vehicle

14.4 DELIVERABLES:

- Distress data of pavements and shoulders for the designated routes

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*The resources required for this activity have been estimated by the Technical Services Division

15. OBJECTIVE: DETERMINE CONDITION AND NEEDS FOR PAVEMENTS AND SHOULDERS OF NYS HIGHWAY SYSTEM

15.1 RATIONALE:

- Documentation of the condition and needs (in terms of required treatments and costs) of the state highway system is the ultimate goal of this project.

15.2 TASKS:

1. Analyze the collected distress and other data and establisn needed treatments, expected lives and costs.

2. Produce reports on the condition of the pavements and shoulders of the entire state highway system.

15.3 RESOURCES:

- Engineers and computer programmers
- 8 persons
- 4 months
- Equipment - computer

15.4 DELIVERABLES:

- Reports on condition and needs of the pavements and shoulders of the state highway system

6. SCHEDULE OF ACTIVITIES

Figure 2 shows the flow chart of the activities of this project. Each activity is identified with its name and number in a manner consistent with the diagram of objectives (Figure 1). Blocks described as "dummy" are auxiliary and are used for the sole purpose of running the computer program that produces the schedules and critical path for this project.

The month-by-month schedule of the various activities of this project is shown in Table 3. The time schedule begins of the project approval date and ends at the date of completion of the reports on the condition and needs of the NYS highway system. Shown in Table 3 are activity durations (in months) as well as the durations of preliminary work and allowable delays (i.e., delay that will not affect the final completion date of the project).

The last row of Table 3 indicates the times of three major decision points. A brief description of each decision point is given below.

Decision Point 1

The first decision point will address the manner in which the entire state system will be surveyed. By that point in time, the mechanical aspects of the survey will have been developed. These include the identification of meaningful pavement distresses, measuring scales, and survey operations. Also, preliminary work will have been completed on determining treatments, service lives, costs, identification of data types to be used, and the establishment of data management capabilities.

FIG. 2. FLOW CHART OF ACTIVITIES

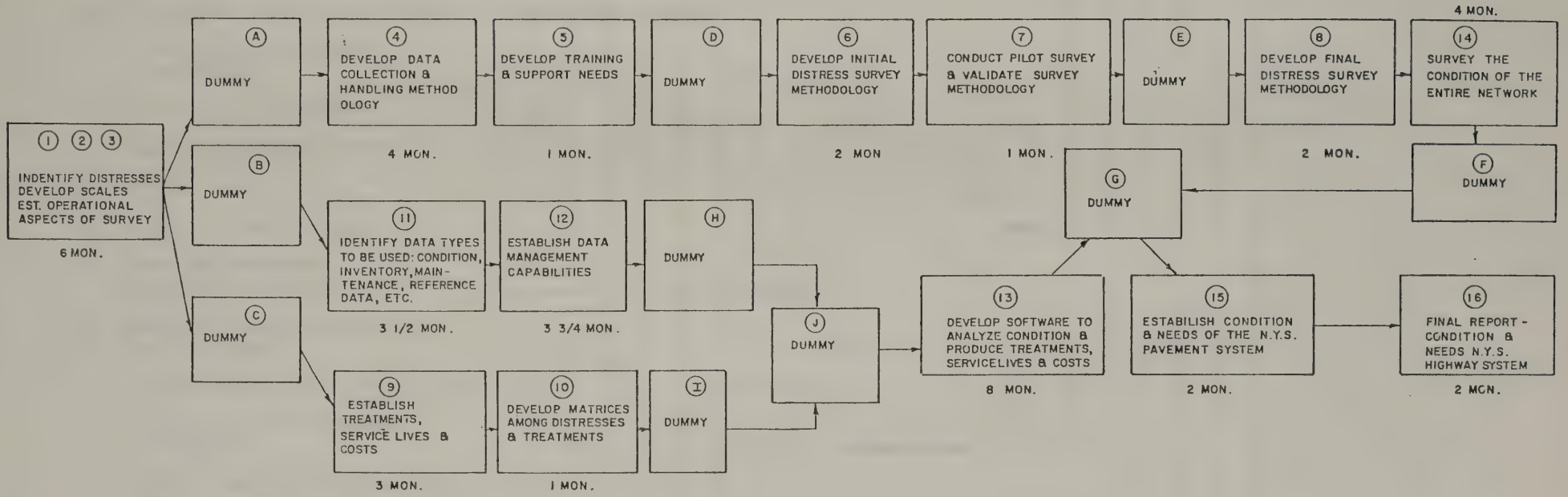
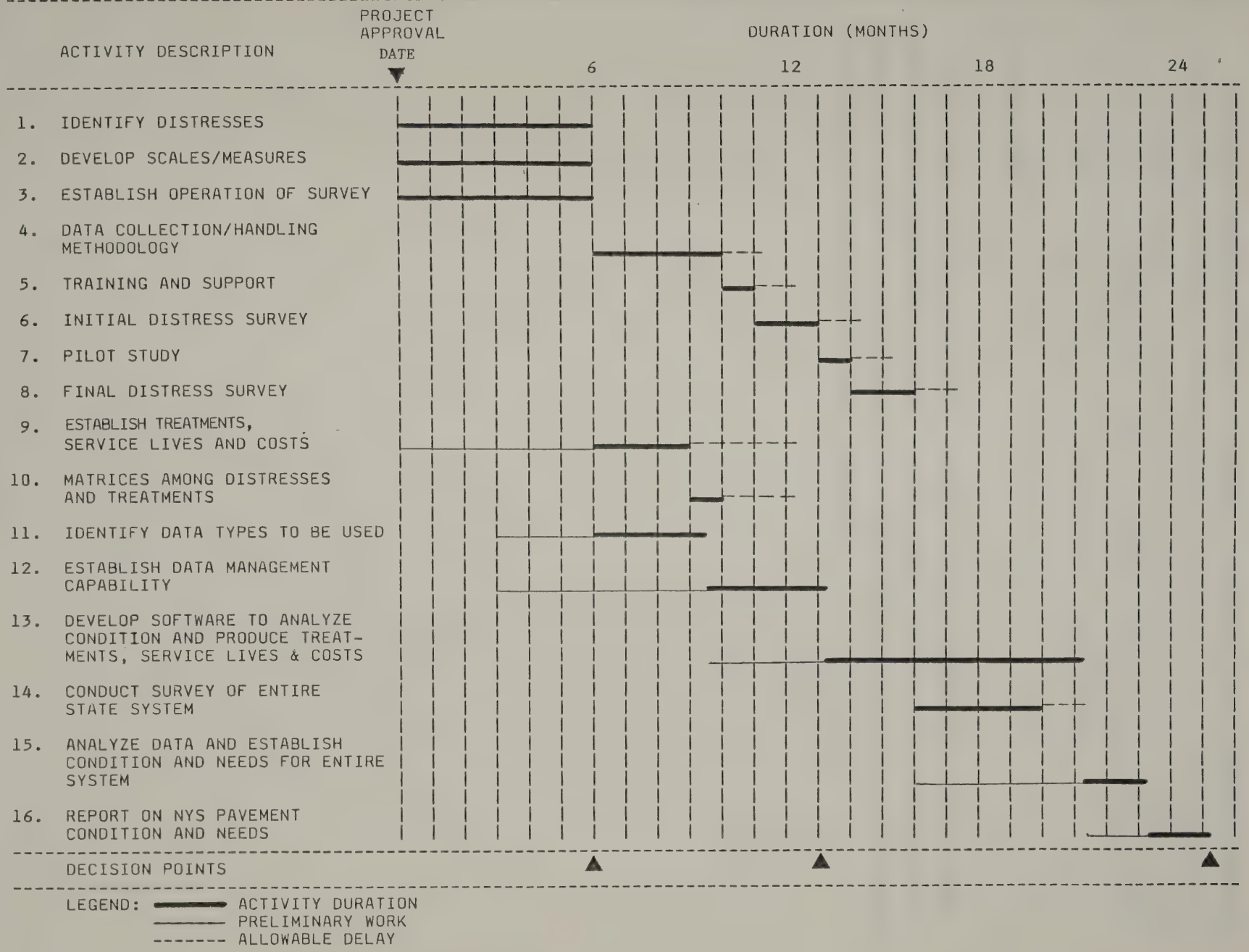


TABLE 5. MONTH-BY-MONTH SCHEDULE OF THE PROJECT BEGINNING AT THE PROJECT APPROVAL DATE



Decision Point 2

The second decision point will address the analysis and reporting methods on condition and needs of the state highway system as well as the development of appropriate software. By that point in time, the methodology of the survey will have been developed along with treatments, service lives, costs, condition/treatment matrices and data base management capabilities.

Decision Point 3

The third decision point will address future developments in the Department's Pavement Management System. By that point in time, the early products associated with the survey, analysis and reporting of the condition and needs of the state system will have been completed.

7. PARTICIPATION OF VARIOUS GROUPS

In Table 4 is shown the manner in which the various groups that compose the Task Force will participate in the activities of this project. The determination of this participation format was made during the Task Force Meeting of June 22, 1987. Each activity has a Lead Group denoted by an X with a circle and Member Groups denoted simply by an X.

It can be seen from Table 4 that the Technical Services Division has the lead role in the activities associated the Engineering/Technical aspects of the project. The Planning Division has the lead in the data collection and handling methodology and in conducting the survey. Finally, the IRM group has the lead in activities concerned with computer software and associated data management requirements.

ACTIVITY	TECHNICAL SERVICES DIVISION	PLANNING DIVISION	REGIONAL GROUP	HIGHWAY MAINTENANCE DIVISION	PPMG	IRM	OSPAMS	GRIC
1. IDENTIFY DISTRESSES	(X)	X		X				
2. DEVELOP SCALES/MEASURES	(X)	X		X				
3. ESTABLISH OPERATION OF SURVEY	(X)	X		X				
4. DATA COLLECTION/HANDLING METHODOLOGY	X	(X)		X		X		
5. TRAINING AND SUPPORT	(X)	X	X					
6. INITIAL DISTRESS SURVEY	(X)	X						
7. PILOT STUDY	(X)	X						
8. FINAL DISTRESS SURVEY	(X)	X	X					
9. ESTABLISH TREATMENTS, SERVICE LIVES AND COSTS	(X)		X	X				
10. MATRICES AMONG DISTRESSES AND TREATMENTS	(X)		X	X				
11. IDENTIFY DATA TYPES TO BE USED	X	X				(X)		
12. ESTABLISH DATA MANAGEMENT CAPABILITY	X	X				(X)		
13. DEVELOP SOFTWARE TO ANALYZE CONDITION AND PRODUCE TREATMENTS, SERVICE LIVES & COSTS	X	X				(X)		
14. CONDUCT SURVEY OF ENTIRE STATE SYSTEM	X	(X)	X	X				
15. ANALYZE DATA AND ESTABLISH CONDITION AND NEEDS FOR ENTIRE SYSTEM	(X)	X	X	X	X	X	X	X
16. REPORT ON NYS PAVEMENT CONDITION AND NEEDS	(X)	X	X	X				
17. MANUAL OF DISTRESS SURVEY	(X)							
18. ANALYSIS AND REPORT OF PILOT STUDY	(X)	X						
19. REPORT ON TREATMENT SELECTION METHODOLOGY	(X)							
20. SOFTWARE MANUALS	X	X				(X)		

LEGEND: (X) LEAD GROUP
X MEMBER GROUP

8. SYNTHESIS OF ACTIVITIES AND REQUIRED HUMAN RESOURCES

1. TECHNICAL SERVICES DIVISION

MONTH-BY-MONTH LIST OF ACTIVITIES AND REQUIRED HUMAN RESOURCES
FOR TECHNICAL SERVICES DIVISION

MONTH	ACTIVITY	MANPOWER	MAN MONTHS
0-3	Main: 1, 2, 3 Prelim: 9	3 Engineers 2 Technicians	9 Engineering 6 Technician
3-6	Main: 1, 2, 3 Prelim: 9, 11, 12	3 Engineers 2 Technicians Support Person 11, 12	9 Engineering 6 Technician 3 Support
6-10	Main: 4, 9, 10, 11 Prelim: 12	3 Engineers Support Person 4, 11, 12	12 Engineering 4 Support
10-16	Main: 5, 6, 7, 8, 12 Prelim: 13	3 Engineers 2 Technicians Support Person 12, 13	18 Engineering 12 Technician 6 Support
16-21	Main: 13, 14 Prelim: 15	3 Engineers 1 Computer Person Support Person 13,14	15 Engineering 5 Computer 5 Support
21-25	Main: 15, 16	4 Engineers 2 Computer People	16 Engineering 8 Computer
	TOTALS	4 Engineers 2 Technicians 2 Computer People 1 Support Person	79 Engineering 24 Technician 13 Computer 18 Support

2. PLANNING DIVISION

MONTH-BY-MONTH LIST OF ACTIVITIES AND REQUIRED HUMAN RESOURCES FOR PLANNING DIVISION*

MONTH	ACTIVITY	MANPOWER	MAN MONTHS
0-3	Main: 1, 2, 3 Prelim: 9	Support Person 1, 2, 3	3 Support
3-6	Main: 1, 2, 3 Prelim: 9, 11, 12	Support Person 1, 2, 3, 11, 12	3 Support
6-10	Main: 4, 9, 10, 11 Prelim: 12	1 Engineer 1 System Analyst 1 Data Analyst 2 Programmer Analyst Support Person 11, 12	4 Engineering 4 System Analyst 4 Data Analyst 4 Programmer Analyst 4 Support
10-16	Main: 5, 6, 7, 8, 12 Prelim: 13	Support Person 5, 6, 7, 8, 12, 13	6 Support
16-21	Main: 13, 14 Prelim: 15	1 Engineer 24 Technicians Support Person 15	5 Engineering 120 Technician 5 Support
21-25	Main: 15, 16	Support Person 15, 16	4 Support
	TOTALS	1 Engineer 1 System Analyst 1 Data Analyst 2 Programmer Analyst 24 Technicians 1 Support	9 Engineering 4 System Analyst 4 Data Analyst 4 Programmer Analyst 120 Technician 25 Support

*Human resources estimated by the Technical Services Division

3. REGIONAL GROUP

MONTH-BY-MONTH LIST OF ACTIVITIES AND REQUIRED HUMAN RESOURCES
FOR REGIONAL GROUP

MONTH	ACTIVITY	MANPOWER	MAN MONTHS
0-3	Main: 1, 2, 3 Prelim: 9	Support Person 9	3 Support
3-6	Main: 1, 2, 3 Prelim: 9, 11, 12	Support Person 9	3 Support
6-10	Main: 4, 9, 10, 11 Prelim: 12	Support Person 9, 10	4 Support
10-16	Main: 5, 6, 7, 8, 12 Prelim: 13	Support Person 5, 8	6 Support
16-21	Main: 13, 14 Prelim: 15	Support Person 14, 15	5 Support
21-25	Main: 15, 16	Support Person 15, 16	4 Support
	TOTALS	1 Support Person	25 Support

4. HIGHWAY MAINTENANCE DIVISION

MONTH-BY-MONTH LIST OF ACTIVITIES AND REQUIRED HUMAN RESOURCES
FOR HIGHWAY MAINTENANCE DIVISION

MONTH	ACTIVITY	MANPOWER	MAN MONTHS
0-3	Main: 1, 2, 3 Prelim: 9	Support Person 1, 2, 3, 9	3 Support
3-6	Main: 1, 2, 3 Prelim: 9, 11, 12	Support Person 1, 2, 3, 9	3 Support
6-10	Main: 4, 9, 10, 11 Prelim: 12	Support Person 4, 9, 10	4 Support
10-16	Main: 5, 6, 7, 8, 12 Prelim: 13	N/A	N/A
16-21	Main: 13, 14 Prelim: 15	Support Person 14, 15	5 Support
21-25	Main: 15, 16	Support Person 15, 16	4 Support
	TOTALS	1 Support Person	19 Support

5. PROGRAM PLANNING AND MANAGEMENT GROUP (PPMG)

MONTH-BY-MONTH LIST OF ACTIVITIES AND REQUIRED HUMAN RESOURCES FOR PPMG

MONTH	ACTIVITY	MANPOWER	MAN MONTHS
0-3	Main: 1, 2, 3 Prelim: 9	N/A	N/A
3-6	Main: 1, 2, 3 Prelim: 9, 11, 12	N/A	N/A
6-10	Main: 4, 9, 10, 11 Prelim: 12	N/A	N/A
10-16	Main: 5, 6, 7, 8, 12 Prelim: 13	N/A	N/A
16-21	Main: 13, 14 Prelim: 15	Support Person 15	5 Support
21-25	Main: 15, 16	Support Person 15	2 Support
	TOTALS	1 Support Person	7 Support

6. INFORMATION RESOURCES MANAGEMENT (IRM)

MONTH-BY-MONTH LIST OF ACTIVITIES AND REQUIRED HUMAN RESOURCES FOR IRM*

MONTH	ACTIVITY	MANPOWER	MAN MONTHS
0-3	Main: 1, 2, 3 Prelim: 9	N/A	N/A
3-6	Main: 1, 2, 3 Prelim: 9, 11, 12	1 Chief Programmer 1 System Analyst 5 Member User Group 2 Programmer	3 Chief Programmer 3 System Analyst 15 Member Group 6 Programmer
6-10	Main: 4, 9, 10, 11 Prelim: 12	1 Chief Programmer 1 System Analyst 1 Communication Eng. 5 Member User Group 2 Programmers Support Person 4	4 Chief Programmer 4 System Analyst 4 Communication Eng. 20 Member User Group 8 Programmer 4 Support
10-16	Main: 5, 6, 7, 8, 12 Prelim: 13	1 Chief Programmer 1 System Analyst 1 Communication Eng. 2 Programmers	2 Chief Programmer 2 System Analyst 6 Communication Eng. 4 Programmer
16-21	Main: 13, 14 Prelim: 15	1 Chief Programmer 1 System Analyst 2 Programmers Support Person 15	5 Chief Programmer 5 System Analyst 10 Programmer 5 Support
21-25	Main: 15, 16	Support Person 15	4 Support
	TOTALS	1 Chief Programmer 1 System Analyst 1 Communication Eng. 5 Member User Group 2 Programmers 1 Support Person	14 Chief Programmer 14 System Analyst 10 Communication Eng. 35 Member User Group 28 Programmers 13 Support Person

*Human resources estimated by the Technical Services Division

7. OFFICE OF STRATEGIC PLANNING AND MANAGEMENT SYSTEMS (OSPAMS)

MONTH-BY-MONTH LIST OF ACTIVITIES AND REQUIRED HUMAN RESOURCES FOR OSPAMS

MONTH	ACTIVITY	MANPOWER	MAN MONTHS
0-3	Main: 1, 2, 3 Prelim: 9	N/A	N/A
3-6	Main: 1, 2, 3 Prelim: 9, 11, 12	N/A	N/A
6-10	Main: 4, 9, 10, 11 Prelim: 12	N/A	N/A
10-16	Main: 5, 6, 7, 8, 12 Prelim: 13	N/A	N/A
16-21	Main: 13, 14 Prelim: 15	Support Person 15	5 Support
21-25	Main: 15, 16	Support Person 15	2 Support
	TOTALS	1 Support Person	7 Support

8. THE GOVERNOR'S ROADWAY IMPROVEMENT COMMITTEE (GRIC) TASK FORCE

MONTH-BY-MONTH LIST OF ACTIVITIES AND REQUIRED HUMAN RESOURCES FOR GRIC TASK FORCE

MONTH	ACTIVITY	MANPOWER	MAN MONTHS
0-3	Main: 1, 2, 3 Prelim: 9	N/A	N/A
3-6	Main: 1, 2, 3 Prelim: 9, 11, 12	N/A	N/A
6-10	Main: 4, 9, 10, 11 Prelim: 12	N/A	N/A
10-16	Main: 5, 6, 7, 8, 12 Prelim: 13	N/A	N/A
16-21	Main: 13, 14 Prelim: 15	Support Person 15	5 Support
21-25	Main: 15, 16	Support Person 15	2 Support
TOTALS		1 Support Person	7 Support

9. ORGANIZATIONAL PLAN

Figure 3 outlines schematically the home organization of the component of this project that will be conducted within the Technical Services Division. The development team will be housed in the Soil Mechanics Bureau and will be linked with the Highway Design and Construction Section. The latter will assist the effort with its knowledge in pavement engineering, shoulder specification and performance, and established access to relevant expertise and records in the Regions and Main Offices.

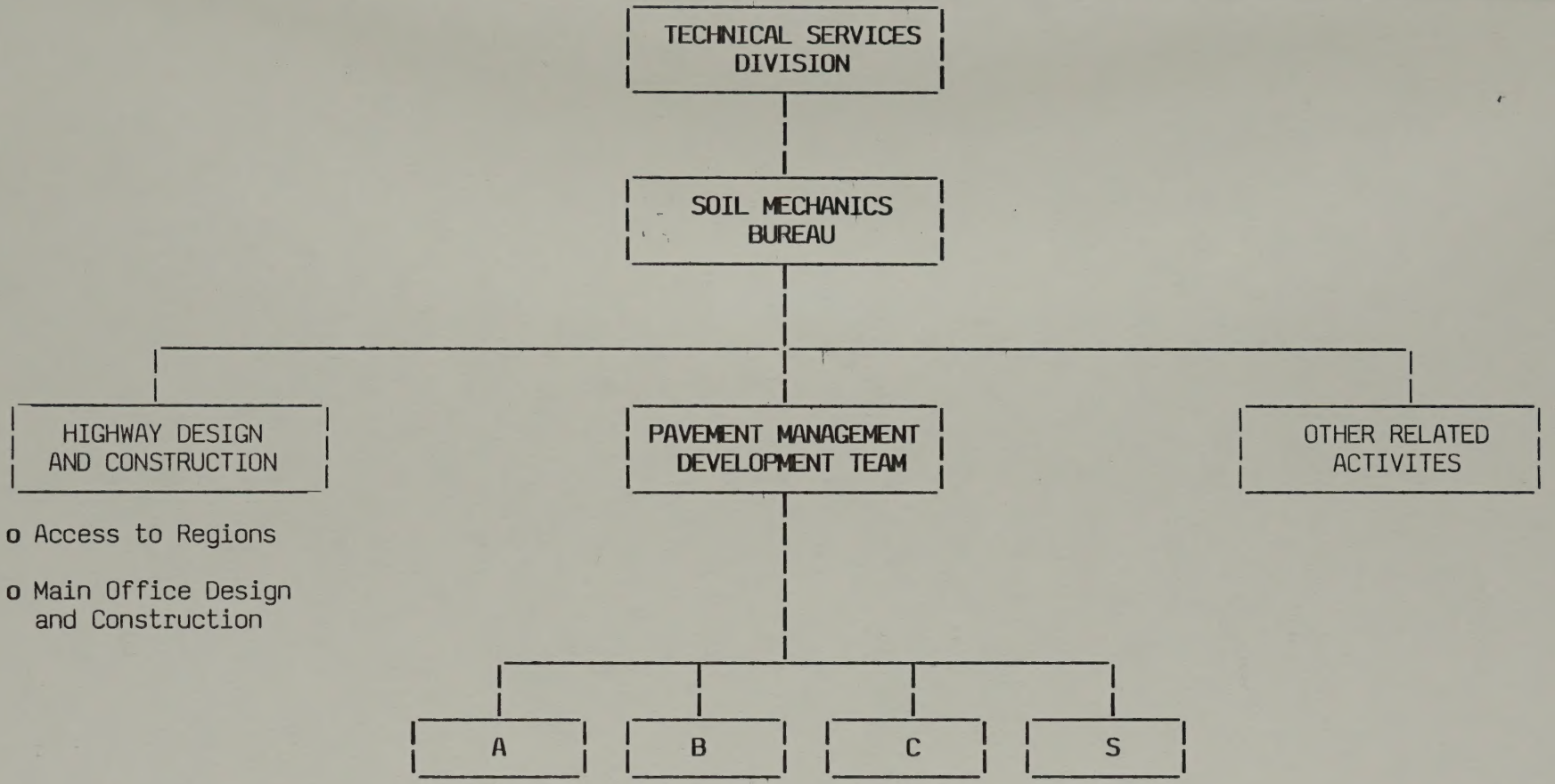
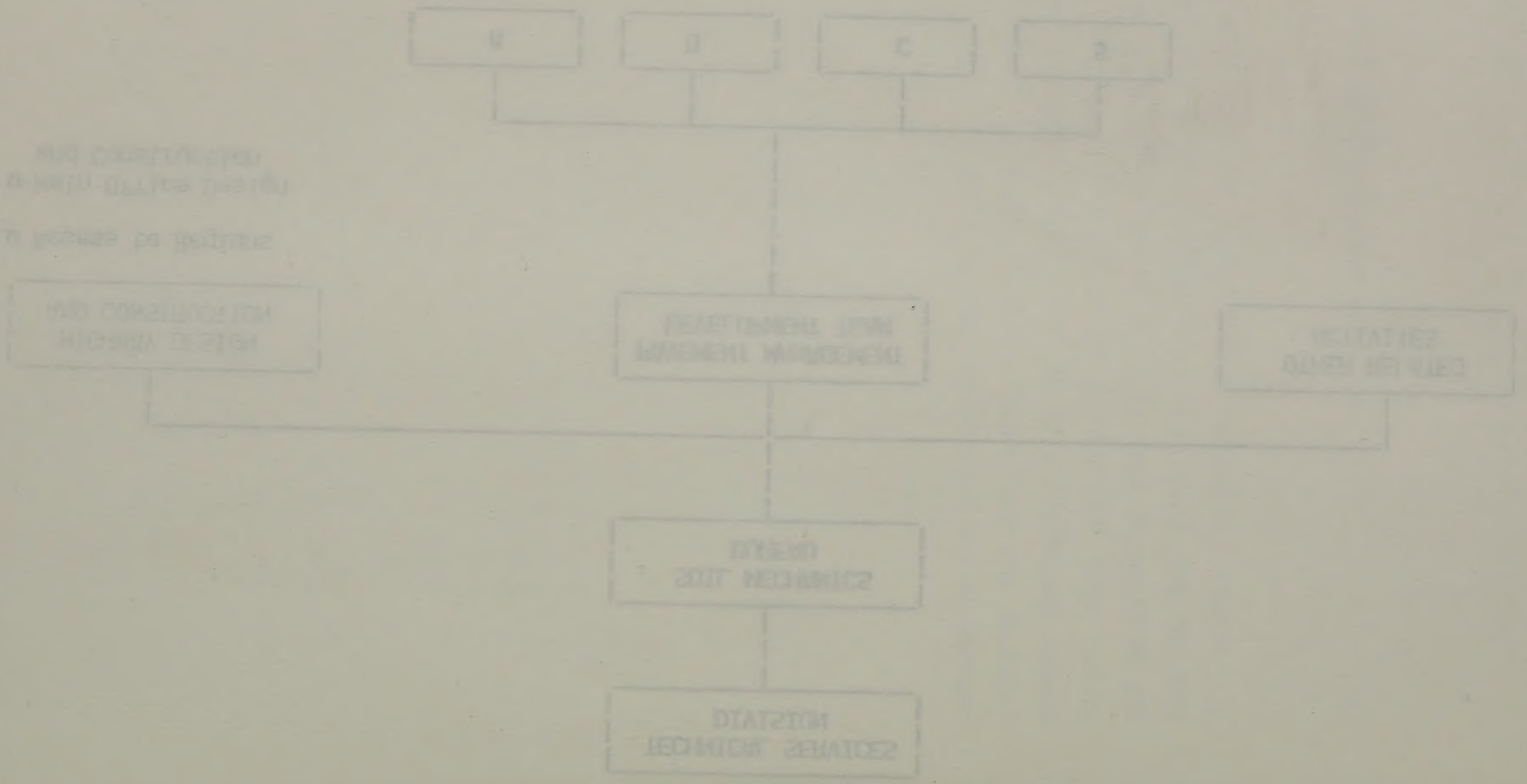


FIGURE 3. HOME ORGANIZATION OF THE EFFORT WITHIN THE TECHNICAL SERVICES DIVISION



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